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The Effectiveness of Token Economy in Reducing Social Media Addiction to Instagram Among Adolescents

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ABSTRACT
Both national and international surveys indicate high levels of social media use among Indonesians, including adolescents. This phenomenon raises the potential for social media addiction, which can lead to psychological disorders. This study aims to test the effectiveness of economic incentives in reducing the level of *Instagram* social media addiction among adolescents. The approach used is an experiment with *a single-case experimental design* (A-B-A). The research subject is a 16-year-old male adolescent who has undergone *screening* (*single-case experimental design*). The research instruments used include *the Instagram Addiction Scale* (TIAS) and the *screen time* feature. The research data were analyzed using visual analysis, *the percentage of non-overlapping data* (PND), and Tau-U. The results showed that an economic incentive system can significantly reduce the level of Instagram social media addiction among adolescents, both in terms of usage categories and duration. These findings contribute to the development of behavioral modification studies and can be applied by parents and educational figures to ensure adolescents use social media optimally.

Keywords : Token Economy, Social Media Addiction, Single Subject Research.

INTRODUCTION

Technological developments have shifted the paradigm of social interaction. Today, social media is not only a communication tool but also a digital ecosystem that influences individuals psychologically. The ease of access to social media has led to a transition from functional use to maladaptive use, namely social media addiction. Social media addiction is caused by a failure of self-regulation. Social media users without good self-regulation will slowly and unconsciously enter a dopamine loop within the platform (Adityaputra & Salma, 2022). This system serves as a turning point for individuals to recognize the risks associated with the evolution of social media.

The phenomenon of social media addiction is not merely a theoretical construct, but has also been empirically proven. Results from a *GoodStats* survey indicate that people use social media for 4–6 hours per day, with 51% of users being millennials and 31% Gen Z, while the remainder are children and parents (Yonatan, 2025). The official website of *Radio Republik Indonesia* cites results from the *We Are Social* survey, stating that out of Indonesia's 180 million residents, the average social media usage is 3 hours and 7 minutes (ranking 16th globally as users with the longest duration (Amanda, 2026). The issue of social media addiction can increase the risk of anxiety, depression, emotional disturbances, and disrupted sleep patterns, as well as reduce focus on learning, academic performance, and

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communication skills (Putri et al., 2025). This phenomenon underscores the urgency of efforts to identify practical interventions for this population.

LITERATURE REVIEW

To understand the root of the problem and formulate solutions, we need to draw on Skinner's behaviorist theory, which posits that behavior followed by positive reinforcement tends to be repeated (Hamruni et al., 2021). Furthermore, a broader framework that can be utilized is the concept *of contingency management*, which involves establishing explicit and systematic rules in the form of conditional causal relationships (Stanley et al., 2022). The principle applied is the existence of a rule-enforcement contract and ensuring that the behavior used to exchange *for rewards* is specific and objective. In the context of social media, reinforcement stems from its mechanisms, namely the dopamine loop and the *infinite scrolling* feature (Amirthalingam & Khera, 2024). The dopamine loop can be understood as some users seeking satisfaction by sharing content, while others seek satisfaction by receiving content and providing feedback. Meanwhile, the *infinite* scrolling feature removes *stopping cues*, causing users to scroll continuously.

This mechanism creates a psychological dependence that can be explained through social media addiction theory. Griffths' theory of social media addiction states that scrolling behavior will dominate one's thoughts (*salience*) and be used to regulate mood (*mood modification*), thereby increasing the need to use social media (*tolerance*) and causing discomfort when not using it (*withdrawal*) (Aprilia et al., 2020). This creates conflict in other aspects, and excessive scrolling behavior will recur after it has been completed. As a solution to break this instant reinforcement mechanism, this study employs a behavioral modification technique known as the token economy. The token economy redirects the instant reinforcement obtained from social media toward conditioned reinforcement, aiming to foster more positive intrinsic motivation (Rosdiana, 2022). This intervention establishes a substitute reinforcer and relevant conditioned satisfaction for adolescents.

From this theoretical framework, efforts to address social media addiction using economic incentives have been undertaken by several previous researchers (Mardhiah et al., 2025; Mardhatillah et al., 2026; Musalmah et al., 2024; Stanley et al., 2022). These studies provide experimental evidence that economic incentives can reduce the intensity of digital screen use and levels of social media addiction. However, there are two limitations: the use of single-subject designs, which limits generalizability, and the lack of follow-up measurements regarding the durability of intervention effects. Furthermore, the researchers conducted a literature review analyzing 37 of 697 articles on similar topics, identifying three limitations and gaps in previous research. First, the persistence of target behaviors remains questionable. Second, there is a lack of maintenance procedures. Third, there is a scarcity of research comparing maintenance procedures (Regnier et al., 2022).

Given these research gaps, there is a need for experimental studies on token economics involving a larger sample size. Additionally, follow-up research to identify the persistence of behavioral changes represents a novel research direction. This study aims to address the gap regarding the sustainability of behavioral changes. Thus, the significant contribution of token

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economics to reducing social media addiction can be validly demonstrated, and further research is required to address the previously identified research gaps.

Based on this explanation, this study aims to examine the effectiveness of an economic incentive system in reducing social media addiction among adolescents classified as having high levels of addiction, by identifying the sustainability of behavioral changes both during the intervention phase and after the intervention has ended. Based on this objective, the hypothesis proposed by the researchers is that there will be a reduction in addiction scores and the duration of social media use among the study participants following the implementation of an economic incentive system.

METHODS

Research Subject

This study employs a quantitative approach using an experimental method. The research design used is a one-group pre-test and post-test design with a single-case experimental design (SCED). This design was chosen because the study was conducted on a single group without a control group, yet it still allows for an in-depth measurement of behavioral changes in specific individuals.

The subject was a 16-year-old male adolescent selected using purposive sampling. The criteria used included: 1) Having a high social media addiction score based on The Instagram Addiction Scale (TIAS), 2) Using the screen time feature on their device, 3) Not working or being required to be active on Instagram for long periods of time, 4) Willingness to participate in the entire research procedure by signing an informed consent form. These criteria served as a means of controlling for other factors that could influence the research data.

The category cut-offs and TIAS classifications (1-5 on a Likert scale) were calculated using a categorization formula based on the mean score and hypothetical standard deviation (Azwar, 2021). The categorization calculation yielded the following results: scores of 89-120 (severe category), 56-88 (moderate category), and 24-65 (mild category). Therefore, the minimum TIAS score that the subject must meet is 89, indicating a high category. Based on the TIAS scale measurement, the research subject received an addiction score of 96, which is classified as high. Thus, the subject met all criteria and was deemed eligible to participate in the intervention.

Research Procedures

The research procedure was divided into three phases: the baseline phase (A1), the intervention phase (B), and the post-intervention phase (A2). The baseline phase (A1) involved calculating the total duration of the subjects' social media use over 7 days, as well as their average daily usage, using the "screen time" feature. These baseline results served as the basis for determining the maximum number of tokens a subject could collect each day. In addition, subjects were also given the Instagram Addiction Scale (TIAS) as a pre-test to measure their level of social media addiction.

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Table 1. Social Media Usage Duration Baseline Phase (A1)

Day	Day	Duration	
		Hours	Minute
1	Sunday	5 hours 4 minutes	304 minutes
2	Monday	3 hours 17 minutes	197 minutes
3	Saturday	3 hours 23 minutes	203 minutes
4	Wednesday	3 hours 40 minutes	220 minutes
5	Thursday	3 hours 46 minutes	226 minutes
6	Friday	4 hours 43 minutes	283 minutes
7	Saturday	6 hours	360 minutes
Total		29,88 hours/29 hours 53 minutes/week	
Average		4,27 hours /4 hours 16 minutes/day	

The baseline results (A1) showed that the subjects' total social media usage was 29 hours and 53 minutes over 7 days, averaging 4 hours and 16 minutes, or 256 minutes, per day. Therefore, the subjects could earn a maximum of 8 tokens each day. During the intervention phase (B), the subjects were subjected to an economic token system for 14 days. For each successful reduction in usage duration according to the token economy procedure, the subject would receive a token that could be exchanged for *a reward*. Token redemption occurred twice, on the 7th and 14th days of the intervention phase. The minimum target reduction in social media usage was 30 minutes, so a reduction in multiples of 30 minutes would be equivalent to one additional token. The token distribution scheme is shown in **Table 2**.

Table 2. Token Economy Distribution Scheme

No.	**Duration Reduction**	**Token**	***Reward***	
			Session 1 Exchange	**Session 1 Exchange**
1	30 minutes	1 token	(1-28) Package includes: • *Notebook* • Pen • Keychain • Snacks (29-56) Package contains: • Plastic tumbler • *Notebook* • Pen • Small gold 0,001 gram (2 pcs) • Keychain • Snacks	(1-28) Package includes: • Lunch box • *Notebook* • Pen • Snacks (29-56) Package contains: • Glass tumbler • Lunch box • *Notebook* • Pen • Small gold 0,001 gram (2 pcs) • Snack
2	60 minutes	2 tokens		
3	90 minutes	3 tokens		
4	120 minutes	4 tokens		
5	150 minutes	5 tokens		
6	180 minutes	6 tokens		
7	210 minutes	7 tokens		
8	240 minutes	8 tokens		

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The token distribution scheme is shown in Table 2. During the intervention phase (B), participants received economic token treatment for 14 days. Each time a participant successfully reduced their usage duration in accordance with the economic token procedure, they were given tokens that could be exchanged for rewards. The researcher distributed the tokens to the participants in person each day. To receive a reward, participants must redeem at least 1-28 tokens for a small reward and 29-56 tokens for a large reward. Token redemption for rewards took place twice, in person on days 7 and 14 of the intervention phase. At each redemption, participants could receive only one category of reward (small or large) based on the number of tokens redeemed.

The third phase was the baseline (A2), which involved remeasuring the duration of Instagram use over a 4-day period after the intervention had been completely discontinued. This was done to assess the persistence of behavioral changes. After the baseline data were collected, the researchers administered a post-test the Instagram Addiction Scale (TIAS) to the participants to measure changes in their level of social media addiction.

Data Collection Techniques

The research instrument used was the 24-item Instagram Addiction Scale (TIAS) to measure the subjects' social media addiction levels before and after the intervention (Sholeh & Rusdi, 2019). Categorization was calculated using the categorization formula (Azwar, 2021). The scale consists of two sections: Instagram feed addiction and Instagram Stories addiction. Additionally, the "screen time" feature on the participants' devices was used to objectively monitor the duration of their social media use.

Data Analysis Techniques

The research results were analyzed using three analytical techniques, following a descriptive analysis to compare TIAS scores before and after the intervention. First, a visual analysis was conducted to examine trends, stability, and changes in levels across phases on the graph. Trends were measured using the split-middle method, which involves dividing the data for each phase into two groups to compare their median values (Darmawan et al., 2024). Data stability was assessed by determining the median for each phase and using a 15% threshold to identify the percentage of data points falling within that range (Yuwono, 2020). Meanwhile, changes in the data are measured by the difference between the closest data points across phases (Yuwono, 2020). This analysis is commonly used in experimental research to identify changes through the curves shown in the research phase graphs

Second, the percentage of non-overlapping data (PND) is used to assess the effectiveness of the intervention, with the following guidelines: >90% is highly effective, 70-90% is effective, 50-70% is questionable, and <50% is ineffective (Darmawan et al., 2024). This technique is used because it is easy to calculate, separates baseline and intervention data from overlap, and is commonly used in single-subject experimental research. Third, Tau-U analysis is used to measure the effectiveness of the intervention by pairing baseline and intervention data one by one. The effectiveness criteria used range from -1 to +1 (Lee & Cherney, 2018). The closer the value is to 1, the greater the effectiveness of the intervention. This analysis offers a higher level of precision in distinguishing the intervention's effectiveness from mere chance.

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RESULTS

The research findings began with a comparison of the TIAS scale scores from the pre-test and post-test. The pre-test results showed a score of 96, indicating a high category, while the post-test results showed a score of 51, indicating a low category. Based on these measurements, there was a decrease in the level of psychological addiction to Instagram following the implementation of the token economy intervention. Furthermore, the researchers analyzed baseline and intervention screen time data to obtain more comprehensive results. The intervention results are presented in **Table 3**.

Table 3. Duration of Social Media Use During the Intervention Phase (B)

Day	Day/Date	Usage Duration	Reduction Duration	Tokens Earned
1	Sunday/10 May 2026	220 minutes	36 minutes	1 token
2	Monday/11 May 2026	221 minutes	35 minutes	1 token
3	Tuesday/12 May 2026	180 minutes	76 minutes	2 tokens
4	Wednesday/13 May 2026	144 minutes	112 minutes	3 tokens
5	Thursday/14 May 2026	235 minutes	21 minutes	1 token
6	Friday/15 May 2026	172 minutes	84 Minutes	2 tokens
7	Saturday/16 May 2026	269 minutes	13 minutes	0 token
8	Sunday/17 May 2026	128 minutes	128 minutes	4 tokens
9	Monday/18 May 2026	129 minutes	127 minutes	4 tokens
10	Tuesday/19 May 2026	181 minutes	75 minutes	2 tokens
11	Wednesday/20 May 2026	109 minutes	147 minutes	4 tokens
12	Thursday/21 May 2026	86 minutes	170 minutes	5 tokens
13	Jumat/22 Mei 2026	96 menit	160 menit	5 tokens
14	Sabtu/23 Mei 2026	88 menit	168 menit	5 tokens

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Visual Analysis

The results of the visual analysis are presented in graphs according to the aspects being measured: direction, stability, and changes in data levels. The analysis of the direction or trend of the data can be seen in **Figure 1.**

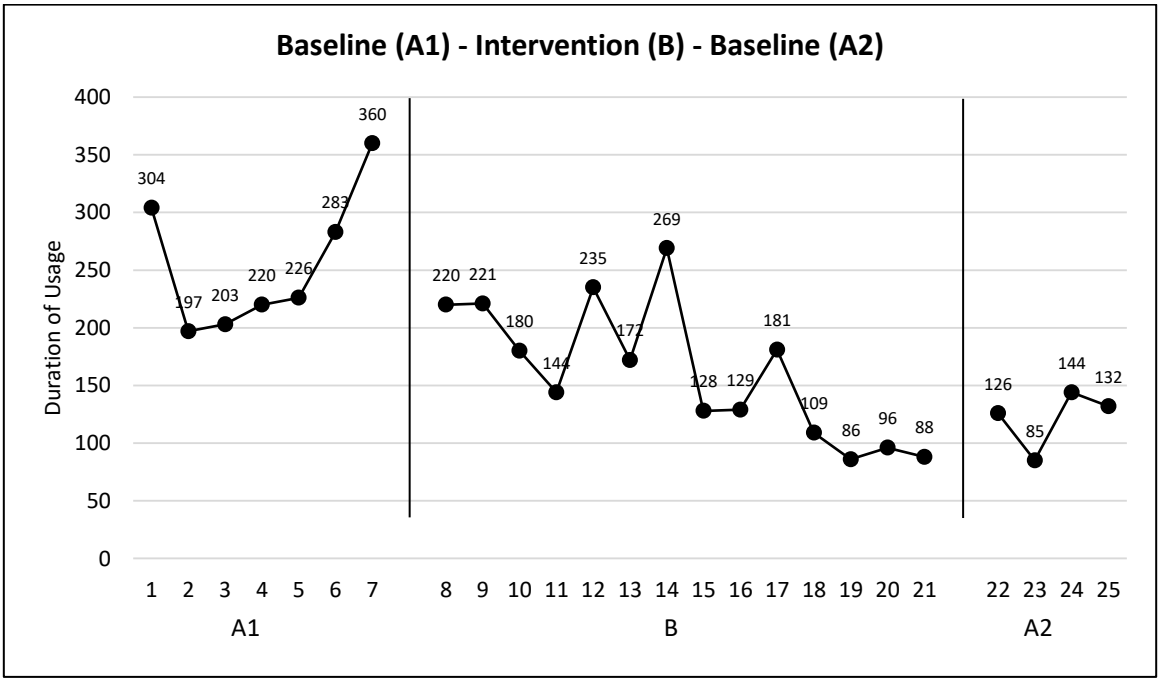


Figure 1. Graphic of Social Media Usage Duration

First, data trend analysis was performed for each phase using the middle-split technique. The baseline phase (A1) was divided into two parts: days 1 through 3 (median = 203) and days 5 through 7 (median = 283), both of which showed an upward trend. The intervention phase (B) was divided into days 8 through 14 (median = 220) and days 15 through 21 (median = 109), showing a downward trend. Meanwhile, the baseline phase (A2) was also divided into two periods: days 22 through 23 (median = 105.5) and days 24 through 25 (median = 138), both of which showed an upward trend. Based on these three trends, the data show a decrease in the duration of social media use (a downward trend) only when the intervention was administered, but an increase during both baseline phases A1 and A2.

Second, stability analysis was conducted using a 15% range limit based on the median value of each phase. The baseline phase (A1), with a median score of 226, had a range of 192–230. In this phase, 4 out of 7 data points fell within the range. The intervention phase (B), with a median score of 158, had a range of 134–182. In this phase, 4 out of 14 data points fall within the range. Meanwhile, the baseline phase (A2), with a median score of 129, has a range of 110–148. In this phase, 3 out of 4 data points do not fall outside the range. This indicates that the data tends to be stable during the baseline phase. Meanwhile, more than 50% of the data from the intervention phase fell outside the specified range. However, this may be influenced by the number of data points. The data fluctuations suggest that the economic token intervention has not yet fully produced a stable behavioral pattern. This also indicates that the subjects' adaptation process to reduced social media usage duration is susceptible to daily fluctuations. Third, an analysis of changes in levels between phases shows a difference of -68

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between the baseline (A1) and intervention (B) medians, which is considered good. Meanwhile, the difference between the intervention (B) and baseline (A2) medians is +29, which is considered poor.

Further analysis revealed an interesting finding: a spike in data over the weekend. Holidays were identified as a variable influencing the intervention. This is because participants had more free time due to the absence of formal activities such as school. The availability of this free time weakens the binding power of the economic token, as the situational urge to access the digital world becomes greater than on regular days. Therefore, holidays are considered a variable that could potentially influence the study's results.

Percentage of Non-Overlapping Data

The PND analysis was conducted by determining the lowest point (lowest usage duration) in the baseline phase (A1), then drawing a horizontal line toward the intervention phase graph for comparison. The lowest data point was 197, and there were 10 data points in the intervention phase with lower (better) values. Furthermore, the researchers used a formula to calculate the percentage.

$$x = \frac{Number\ of\ data\ below\ the\ comparison\ point}{14\ (\text{day})}\ x\ 100\%$$

The researchers used the following guidelines: >90% is highly effective, 70-90% is effective, 50-70% is questionable, and <50% is ineffective. The results of the calculation using this formula showed a score of 71%. Therefore, the economic tokens in this study were deemed effective in reducing social media addiction levels according to the PND calculation. To ensure effectiveness, the researchers used the Tau-U analysis technique, which minimizes outlier bias.

Tau-U Analysis

The researchers conducted a Tau-U analysis to identify the percentage of effectiveness by pairing baseline and intervention data one by one. This analysis was performed to identify effectiveness while minimizing the bias caused by outliers in the baseline data. The Tau-U analysis was conducted in four stages. First, the S-Pairs analysis. S-Pairs is the total number of pairs between each data point in the baseline phase (A1) and the intervention phase (B). The number of data points in phase A1 is denoted by nA1, while the number of data points in phase B is denoted by nB. nA1 equals 7, and nB equals 14, resulting in a total of 98 pairs.

Second, the data pairing process. After calculating the total number of pairs, the researchers paired each set of data until the last pair. Pairs where the baseline score was higher than the intervention score were assigned a value of (+1). If the opposite was true, they were assigned a value of (-1), and a value of (0) if the scores were equal. The pairings are shown in Table 4.

Table 4. Tau-U Analysis

A1/B Score	304	197	203	220	226	283	360
220	(+1)	(-1)	(-1)	(0)	(+1)	(+1)	(+1)

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221	(+1)	(-1)	(-1)	(-1)	(+1)	(+1)	(+1)
180	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
144	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
235	(+1)	(-1)	(-1)	(-1)	(-1)	(+1)	(+1)
172	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
269	(+1)	(-1)	(-1)	(-1)	(-1)	(+1)	(+1)
128	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
129	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
181	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
109	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
86	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
96	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)
88	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)	(+1)

Third, count the total number of positive pairs. After all data from the three phases were paired, there were 84 positive pairs (point B < point A), 13 negative pairs (point B < point A), and 1 tie (point B = point A). Fourth, the calculation is performed using the Tau-U formula. The total number of positive pairs is subtracted from the total number of negative and tied pairs. Next, the researcher calculates the result using the Tau-U formula as follows:

$$Tau\text{-}U = \frac{S}{S\text{-}Pairs}$$

A positive net pairing result is denoted by S. The total number of pairs is denoted by S-Pairs. The calculation yielded a score of 0.72. Tau-U scores range from -1 to +1; the closer the score is to 1, the stronger the effect. Therefore, the economic token system was 72% effective in reducing the level of Instagram addiction among adolescents, as determined by comparing baseline and intervention data.

DISCUSSION

The primary objective of this study is to test the effectiveness of an economic incentive system in reducing the level of Instagram addiction among adolescents. Given the phenomenon of excessive social media use among adolescents, the researchers recognized the importance of researching effective behavior modification techniques to address this issue. In this context, an economic incentive system can be implemented by parents and educators to ensure that adolescents use social media optimally.

Based on the results of the data analysis, the hypothesis stating that economic tokens can effectively reduce the level of social media addiction among adolescents is accepted. This conclusion is supported by the consistency of the results from the psychological scale measurements and the three analyses conducted on the screen time graphs. Categorically, addiction scores decreased from the high category to the low category. Additionally, the data trend showed a decrease in usage duration during the intervention phase of 11 minutes using the middle-split technique. The shift in the trend from an increase at baseline (A1) to a

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decrease during the intervention—confirms the positive impact of economic tokens on Instagram social media usage duration.

From the perspective of Griffiths' addiction theory, economic tokens can influence aspects of social media addiction provided, of course, that they are accompanied by supportive rules and conditions. With this intervention, adolescents' attention, which is otherwise dominated by social media, is also directed toward the tokens as conditioned reinforcers (salience). The delay in receiving rewards reduces the subject's desire to use social media as the primary and sole means of altering their mood, thereby gradually decreasing the need for its use (mood modification and tolerance) (Aprilia et al., 2020). Meanwhile, aspects of withdrawal, conflict, and relapse can be identified through a decrease in Likert scale responses. However, the resurgence in the duration of social media use indicates the extent to which the token economy is effective in the absence of maintenance.

In the context of experimental studies, this research offers new findings when compared to other studies on the effectiveness of economic incentives in modifying social media addiction behavior among adolescents. The pattern of reduced usage duration observed in the subjects of this study aligns with the findings of Mardhatillah et al. (2026), who reported an average reduction of 123 minutes between baseline and intervention. However, this was accompanied by the provision of positive reinforcement. Similar results were also shown in the study by Mardhiah et al. (2025), with reductions of 134 minutes and 49 minutes, respectively, in the average usage time between the baseline phase (A1) and the intervention phase, and between the intervention phase and the baseline phase (A2), which was accompanied by the application of negative punishment. Meanwhile, in this study, a reduction of 50 minutes was observed from the baseline (A1) to the intervention (B), and 89 minutes from the intervention (B) to the baseline (A2). This suggests that combining a token economy with other interventions further increases the reduction in social media usage duration.

Furthermore, both comparative studies noted that there were no data points on the intervention graph that exceeded the baseline threshold (A1). Additionally, the study by Mardhiah et al. (2025) reported that the decrease in duration continued into the baseline phase (A2) for seven days, in contrast to interventions without other reinforcement combinations. This contrasting evidence reinforces the literature stating that the maintenance phase plays a significant role in sustaining adaptive behavior after the intervention is discontinued (Regnier et al., 2022). One form of such maintenance is natural reinforcement that adolescents can obtain outside of the controlled study setting. This study found that the implementation of a token economy without maintenance caused the data trend to rise again or indicated the occurrence of withdrawal.

Furthermore, the effectiveness of the token economy on social media addiction scores was also compared with other studies on a categorical basis. The results of the study by Amalia et al. (2025) on college students demonstrated a decrease in psychological scale scores from high to moderate (a category-level decrease) in the first group and from moderate to moderate (a score-level decrease) in the second group, where the intervention lasted five days. Meanwhile, the participants' scores in this study showed a decrease from the high category to the low category. This difference indicates the influence of the intervention's duration. Additionally, the subjects in this study were adolescents, who are generally more vulnerable

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to instant gratification and have weaker self-regulation (Nazariskina & Selian, 2025). Therefore, this study has highlighted these dynamics over a 14-day period and provides more comprehensive data.

The results of this study were also compared with an international study by Stanley et al. (2022), which evaluated the application of contingency management (CM) in reducing gadget and social media use among college students. In this context, CM is based on the theoretical framework of token economics. In that study, Stanley et al. (2022) reported that CM was effective in reducing the daily usage duration of the study participants. Furthermore, the discontinuation of the intervention in that study produced an effect similar to that observed in this study, namely a rebound in usage duration. These findings suggest that, among both adolescents and college students, this reinforcement-based intervention is susceptible to the effects of dependence on conditioned rewards. However, this susceptibility appears to be more pronounced among adolescents, due to the strong influence of peers in the digital world. In contrast, college students generally engage in more diverse social activities in the real world. Based on the overall discussion, token economies require variation in their implementation. There are at least two possible approaches: combining them with appropriate alternative reinforcements, and using rewards that can rival the psychological appeal of social media features for individuals.

Furthermore, there were unique findings from the graphical analysis. First, there was data instability during the intervention phase, with a stability rate of 42.9%. Subjects were able to reach a high reward level in the second session despite unstable conditions. Second, the peak values for the baseline and intervention phases occurred on Day 7 and Day 14 (Saturday), respectively. These weekends yielded data that differed from the other days. Third, after exchanging tokens and receiving a small reward level, a positive downward trend emerged, allowing the subjects to accumulate enough tokens to exchange for a high reward level. Sudden spikes also decreased, occurring twice in the first session and once in the second session. However, this was followed by a return to increased duration during the baseline (A2).

These findings represent unique aspects that warrant further study. The possibility that external factors or the subjects' own calculations influenced the number of tokens they targeted highlights the need for stricter controls and guidelines in implementing this intervention. Furthermore, this indicates that the subjects were conscious of the need to conserve their tokens in order to achieve higher-level rewards. Thus, tiered rewards have sufficient power to influence adolescents to exercise self-control as a means of deriving satisfaction from the guaranteed success of future rewards (reward redemption schedule). Based on these findings, efforts to modify behavior using this token economy reveal comprehensive psychological dynamics underlying fluctuations in both adaptive and maladaptive behaviors among adolescents.

Although the results of this study demonstrate the effectiveness of economic incentives in reducing the duration of social media use, there are potential biases that need to be considered. Participants who were willing to sign an informed consent form and follow all research procedures are likely individuals who already possessed intrinsic motivation to change (self-selection bias). Thus, positive responses to the intervention cannot be entirely

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separated from the participants' initial willingness to modify their behavior. Furthermore, the subjects' involvement in the behavior monitoring process allows for measurement reactivity that is, behavioral changes that arise because individuals are aware that their behavior is being observed during the study. This self-monitoring effect also indicates a tendency among subjects to reduce their usage duration that is motivated not only by the tokens but also by the subjects' self-awareness, which arises unconsciously during screen time tracking.

In addition, there are potential limitations related to the instruments and data collection methods. First, screen time data was obtained through the devices' built-in features and self-reported by the participants. Therefore, the consistency of data recording and reporting is an aspect that requires attention in the data collection process. Second, the social media addiction scale used is self-report-based, meaning that participants' responses are influenced by their subjective perceptions of themselves. Social media addiction scores obtained through pre-test and post-test measurements may be influenced by participants' psychological states at the time they completed the scale. Therefore, the measurement results represent the participants' condition at the time of data collection and should be understood within that context.

This study employed a single-case experimental design with a single subject selected through purposive sampling based on characteristics relevant to the research objectives. This approach allows for in-depth observation of behavioral changes in the research subject. However, generalizing the findings to a broader population requires replication with different participants and in different research contexts (Tanious et al., 2024). Thus, the results of this study should be understood within the context of the characteristics of the subject studied and cannot yet be broadly generalized to the adolescent population.

The fundamental question that needs to be asked is whether the observed reduction in social media usage will persist outside of the experimental conditions, particularly once researcher supervision is completely discontinued. Based on data from baseline phase A2, the results show that the subjects' Instagram usage duration rose again after the intervention was discontinued. This suggests that the reduction observed during the intervention was still dependent on the presence of tokens and researcher supervision, rather than the subjects having genuinely changed on their own. Outside the research setting, adolescents continue to face various environmental factors that can encourage social media use, such as peer influence, app notifications, and exposure to constantly updated content via social media algorithms (Aprilia et al., 2020). Therefore, follow-up research over a longer period is needed to determine whether these behavioral changes can truly persist without external supervision.

Finally, this study was conducted using Instagram features available during a specific intervention period. Social media platforms, including Instagram, undergo regular algorithm updates and the addition of new features, such as the introduction of Reels, Close Friends, and continuously updated notification mechanisms. These updates have the potential to fundamentally alter the patterns and intensity of the platform's psychological appeal. Nevertheless, the token economy still holds potential for application in efforts to reduce excessive social media use. Updates to the form of reinforcers and adjustments to the intervention scheme need to be considered to ensure the program's effectiveness remains optimal as user characteristics evolve and the digital environment changes. Therefore, further

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research is needed to test the adaptation of the token economy across various platforms and different age groups.

CONCLUSION

This study concludes that the economic token intervention shows potential effectiveness in reducing the level of social media addiction and the duration of Instagram use among the study subjects, namely 16 year old adolescents. This is evidenced by a decrease in the median level across phases, as well as a downward trend during the intervention phase. However, this reduction was influenced by the discontinuation of the intervention, which triggered a relapse effect. These results indicate that the subjects were dependent on external reinforcers. Therefore, the token economy is recommended as a self-control tool, but with a gradual phase-out of the intervention and in combination with natural reinforcers.

LIMITATION

The limitations of this study can be summarized in three points. First, an extreme spike during the baseline phase (A1) caused the intervention trend to appear as a sharp decline. Second, the intervention was discontinued before the data had stabilized. Third, the baseline phase (A2) was too short, limiting the researchers' ability to observe patterns of long-term persistence and stability. Based on the limitations identified in this study, several recommendations are offered for the development of future studies on behavioral modification or token economies. Future researchers are advised to use an A-B-A-B design to establish a stronger evidence of the functional relationship of the intervention. Additionally, the transition from the baseline phase to the intervention phase should occur only after the initial baseline data have stabilized. Finally, future researchers should design the maintenance phase using a tiered exchange schedule, and the intervention should be phased out gradually by replacing the influence of tokens and rewards with more natural reinforcers. Overall, these research recommendations are intended to be utilized to the fullest extent possible as part of a collective effort to develop adaptive and maladaptive behavior modification techniques that are easily applicable in everyday life.

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